



Smaller is better

JSC scientists are getting lots of help building a cytotometer small enough to study individual cells aboard space station. Story on Page 3.



Huge Hubble

A full-scale mock-up of the Hubble Space Telescope was on display in Bldg. 9B at the recent Satellite Servicing Conference. Photo on Page 4.

Space News Roundup

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No. 26

NASA chief Truly gets Senate nod

The U.S. Senate confirmed Rear Adm. Richard H. Truly as NASA's new administrator by voice vote late last Friday, and approved J.R. Thompson as his deputy.

The confirmation followed passage of bills in both the Senate and the U.S. House of Representatives that waived the requirement for the administrator to come from civilian life. The bills, sent to President Bush for his signature, provided that Truly must retire from the U.S. Navy within 60 days of confirmation and allowed him to retain his rank, status and pension as a retired Navy officer.

Truly will officially assume the administrator's post tomorrow. He is expected to retire from the Navy on the same day. Plans for a formal swearing-in ceremony were not yet complete.

During the Senate floor debate, both Sens. Howell T. Heflin, D-Ala., and Herb Kohl, D-Wis., praised Truly's qualifications, although Kohl expressed reservations at waiving the requirement for a civilian NASA administrator.

"Richard Truly is very well qualified to be administrator of NASA," Kohl said. "I believe his experience in the shuttle program will be a great asset in heading the agency, and I welcome his leadership."

Heflin said he thought Truly and Thompson "will make an outstanding duo to run our nation's space program."



Jay Greene



JSC Photo by Bob Walck

SLOGGING THROUGH SPACE—Two young visitors from Claremore, Okla., take refuge from Monday's deluge under a make-shift tarp outside Bldg. 1. Tropical Storm Allison caused some minor roof leaks, flooding and isolated power outages at JSC as it dumped 10 to 16 inches of rain in the area, but created no serious damage. Many employees, however, found it difficult to get to and from work due to street flooding in and around Houston.

Engine shutdown shouldn't delay work on Columbia

By Kyle Herring

Preparations to move *Columbia* from its hangar in the Orbiter Processing Facility at Kennedy Space Center are continuing with the transfer to the Vehicle Assembly Building scheduled for no earlier than 11 a.m. tomorrow.

The damaging of a main engine during testing last Friday at the Space Shuttle Main Engine test complex at NASA's Stennis Space Center in Bay

St. Louis, Miss., will not delay *Columbia's* processing for its Department of Defense mission scheduled for late

next month, according to program officials.

Shuttle managers, at Kennedy for a roll out review meeting, decided to proceed as planned with the schedule until a 12-member board of investigation determines the cause of the damage during the extended duration test.

The development engine shut down automatically 21 minutes into a scheduled 22.25-minute firing designed to test several modified engine components. As it shut down, fire broke out around the engine's powerhead. Early inspection showed significant internal damage to the engine's high-pressure oxidizer turbo-pump. The engine has been flown to its manufacturer, Rocketdyne, for a detailed examination.

Meanwhile, technicians removed an electronic box for the pilot's heads-up display on *Columbia's* flight deck because of an intermittent lighting problem. The new electronic box was installed Wednesday in the middeck and retesting will be required.

Preparations were under way this week to replace another electronic box, called a motor control assembly (MCA). This particular MCA sends



STS-28

commands to the orbiter's vent doors, external tank doors and orbital maneuvering system crossfeed valves.

In addition, the MCA relays information about the position of those systems to the orbiter's cockpit. Engineers discovered that the MCA had experienced a blown fuse link internally.

A positive pressure structural leak test of the aft compartment and midbody was completed Tuesday night and preparations were made to conduct a frequency response test of the orbiter's aerosurfaces late this week.

Technicians are continuing to bond tiles, install gap fillers and fit and install thermal blankets on the payload bay doors. Plans are to move the orbiter to the VAB and complete any remaining tile work there before rolling the orbiter stack to the launch pad in early July.

Top Shuttle program posts filled

Greene becomes acting deputy manager at JSC today

By Kyle Herring

Several personnel changes have taken place in the National Space Transportation System Program Office here at JSC, with the most recent being the designation of Jay Greene to be acting deputy manager of the office effective today.

Leonard Nicholson is acting deputy director of the office. He replaced Richard Kohrs who moved to NASA Headquarters in May to direct the Space Station *Freedom* Program Office.

Elsewhere, Larry Williams was

named to be manager of the Engineering Integration Office and Hal Lambert moved from managing the Customer Integration Office to be acting manager of the Integration and Operations Office.

Greene, who previously was chief of the Safety Division, brings 15 years of NASA experience with him to his new position. From 1974 to 1980 he headed the Flight Dynamics Section and served as a flight dynamics officer in Mission Control for the Apollo Program.

From 1980 to 1982 Greene was chief of the Mission Operations

Branch. During that period he was the ascent flight dynamics officer for the first two space shuttle missions in 1981.

Greene then became a flight director in the Flight Operations Integration Office from 1982 to 1987. He served as ascent flight director for seven shuttle flights. He was also lead flight director for missions STS-41C and STS-51L, the Solar Max repair and Leasat salvage missions, respectively.

In 1987, Greene left the flight director's office to become chief of the Safety Division where he was

Please see **GREENE**, Page 4



Leonard Nicholson

Apollo scientific results reviewed

Knowledge from past two decades provides clues to future

By Pam Alloway

Knowledge gleaned over the past 20 years from the Apollo project has provided key landmarks on future space explorers' map of the stars, say lunar and planetary scientists.

"Apollo gave scientists insight into the Moon's interior and the basic processes taking place in a planet other than Earth," says Dr. James Head, a professor of geological sciences at Brown University in Providence, R.I. Head worked for NASA in the late 1960s and early 1970s, and was involved in selecting lunar landing sites and training astronauts.

Head is one of five scientists who will discuss Apollo scientific results during an anniversary speakers program from 11 a.m. to 2 p.m. July 20 in Teague Auditorium.

"We've used Apollo as a baseline to understand other missions and the information they brought back," Head says. "Apollo really initiated the human exploration of the solar system. What we've found out from the automated probes has whetted our appetites for further human

exploration."

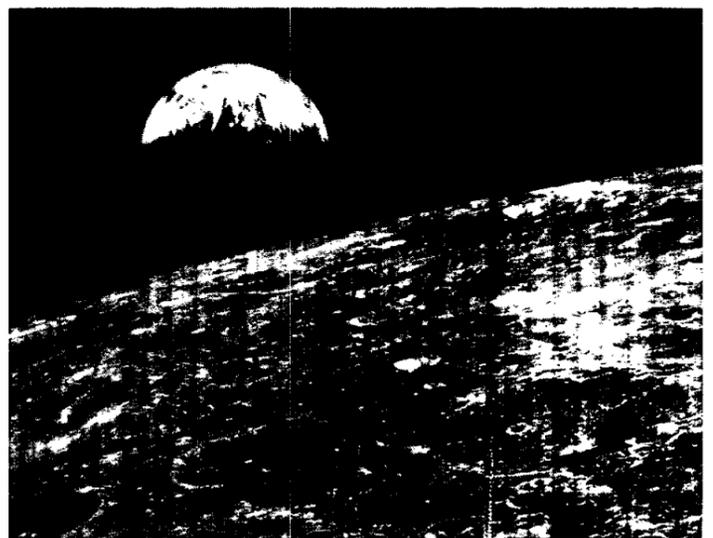
Information from the Apollo project has enabled scientists to better understand the ages of planet surfaces, something that had been only estimated before.

"Apollo has given us insight into the actual history of the solar system," Head says. "From orbit and Earth-based observations you can count craters and estimate surface age, but prior to landing on the Moon and actually examining samples, the estimates were widely varying...now we can extrapolate that information to other places."

Sharing information with fellow space faring nations is an important element in the space exploration equation, scientists say. "It's imperative to share the results," Head says. "Each country is approaching things from a different point of view. The data collected is complimentary...I think Apollo helped demonstrate the importance of sharing information."

The Apollo missions became a valuable part of mankind's history, not unlike the part Columbus' voyages

Please see **APOLLO**, Page 4



NASA Photo

Scientists on Earth have learned much about the Moon and our solar system since this photo was taken in 1966. The photo, taken by Lunar Orbiter 1, was the world's first view of the Earth from the vicinity of the Moon.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays: FBA cards are still available to civil service employees at Bldg. 11 store. FBA Scholarship applications are now available in Building 1 room 840 for FBA members.

General Cinema (valid for one year): \$3.50 each.
 AMC Theater (valid until May 1990): \$3 each.
 Sea-Arama Marineworld (Galveston, valid until Aug. 17, 1990): adults, \$8.75; children \$5.50.
 Sea World (San Antonio, year long): adults, \$17.25; children \$14.75.
 Palm Beach at Moody Gardens (valid until September 1989): adults \$2.75; children \$1.50.
 Astroworld (valid 1989): adults, \$14.12; children under 4, \$11.99; season pass, \$32.36; Waterworld (valid 1989): \$8.15.
 Six Flags (valid 1989): \$14.12.
 River Raft Trip (July 15): \$30.
 Overnight River Raft Trip (July 15-16): \$72.
 Las Vegas Trip (Aug. 17-20, call for reservations): \$280; cash charge \$275.
 Cruise Review Party (July 6-Rec Center Rm. 216, 5-7 p.m.; Cruise scheduled for Nov. 4-11 on Superliner): Approximately \$1,160, including airfare; \$200 deposit to hold reservations.
 Splashdown Party (4:30-8:30 p.m. July 20 at the Rec Center): \$3. Tickets may be purchased from coordinators listed on JSC Announcement 89-112.
 Houston Astros vs. Philadelphia Phillies (July 21, 7:35 p.m., Astrodome): field-level seats \$7.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must sign up in person at the Gilruth. Everyone will be required to show badge or EAA membership card. Payment must be made in full at the time of registration. Classes tend to fill up four weeks in advance.

EAA badges—Dependents and spouses may apply for a picture I.D. 6:30-9:30 p.m. Monday-Friday.

Defensive driving—Course is offered from 8 a.m.-5 p.m., Aug. 19; cost is \$15.

Weight safety—Required for use of the Rec Center weight room. Classes will be 8-9:30 p.m. on July 12 and July 27; cost is \$4.

Aerobics and exercise—Both classes are ongoing; cost is \$24.

Tennis lessons—Beginning tennis, Mondays 5:15-6:45 p.m. Six week course began June 26; \$32 per person.

Scuba lessons—The course includes classroom and pool sessions, open water dive. Five-week class begins July 10; cost is \$45, plus additional fees.

"Moonwalk" tournament—Men's open "C" softball tournament is July 8 and 9. Cost is \$95. Entry deadline is July 6 at 5:30 p.m.

Fun Run—Lunar Rendezvous Fun Run will be held July 15.

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Dates & Data

Today

Cafeteria menu—Special: Salisbury steak. Entrees: baked scrod, broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower au gratin, mixed vegetables, buttered cabbage, whipped potatoes.

Monday

Cafeteria menu—Special: beef and macaroni. Entrees: ham steak, Parmesan steak. Soup: chicken and rice. Vegetables: green beans, carrots, Au Gratin potatoes.

Tuesday

Independence Day—Most offices at JSC will be closed July 4 in observance of the Independence Day holiday.

Wednesday

Cafeteria menu—Special: baked meatloaf with Creole sauce. Entrees: baked scrod, liver and onions, ham steak. Soup: seafood gumbo. Vegetables: beets, Brussels sprouts, green beans, whipped potatoes.

Thursday

NTA banquet—The National Technical Association (NTA-Houston Chapter's annual scholarship and awards banquet will begin at 7 p.m. July 6 at the Doubletree Hotel, Allen Center in downtown Houston. For tickets or information, call George Keys, 280-2081, Yolanda Marshall, 280-7584, or Donna Blackshear, 282-1828.

Cafeteria menu—Special: smothered steak with dressing. Entrees: chicken and dumplings, corned beef with cabbage. Soup: beef and barley. Vegetables: spinach, cabbage, cauliflower Au Gratin, parsley potatoes.

July 7

Child care groundbreaking—A groundbreaking ceremony for the JSC Child Care Center facility will be at 2 p.m. Friday, July 7, at the construction site near the corner of Second Street and Avenue B. All employees are invited to attend.

Cafeteria menu—Special: tuna and

salmon Croquette. Entrees: pork chop with yarn rosette, Creole baked cod. Soup: seafood gumbo. Vegetables: Brussels sprouts, green beans, buttered corn, whipped potatoes.

July 15

Lunar Rendezvous 5K race—The 11th annual Lunar Rendezvous 5K Space Race and 2-mile Fun Walk will begin at 8 a.m. July 15 at the Gilruth Rec Center. Entry fee is \$10, with proceeds benefitting local charity organizations. Entry forms are available at the Rec Center gym office. Those interested in volunteering for the race should contact Len Topolski at 333-5576.

July 17

Lunar exploration film—"For All Mankind", Al Reinhardt's 90-minute feature film on manned lunar exploration will be shown daily during the week of July 17-23 in Teague Auditorium. The film will be featured from 3-4:30 p.m. July 17-21; 7:30-9 p.m. July 17 and 21; and during the JSC Open House on July 22-23 at scheduled times to be posted in Bldg. 2 each day.

Speakers program—"The Moon Before Apollo" will be presented from 11 a.m.-2 p.m. July 17 in Teague Auditorium. Concepts about the origin, evolution, and composition of the moon as well as the unmanned precursor missions will be discussed, and the program is free and open to the public. Contact x38613 for more information.

MOD hospitality suite—The Mission Operations Directorate hospitality suite will be open to MOD employees from 7-11 p.m. July 17 at Kings Inn on NASA Road 1.

Boeing facility tours—Boeing facility guided public tours of the flight processing facility will be held at 2 p.m. daily, July 17-21. Contact Julia Sorrels, 280-2023, for reservations.

July 18

Speakers program—"Planning the Apollo Missions" will be presented from 11 a.m.-2 p.m. July 18 in Teague

Auditorium. Mission operations, communications, guidance, software, propulsion, thermal protection and landing dynamics will be discussed by key project engineers, and the program is free and open to the public. Contact x38613 for more information.

Hospitality suite—The Landing and Recovery Division hospitality suite will be open all day June 18 at the Kings Inn, 1301 NASA Rd. 1. Contact Charles Filley, 333-3919 for more information.

July 19

Speakers program—"Flying the Apollo Missions" will be presented from 11 a.m.-2 p.m. July 19 in Teague Auditorium. A program summary from the perspective of Apollo flight directors, it will be free and open to the public. Contact x38613 for more information.

Recovery Operations reunion—A Recovery Reunion will be held at 7 p.m. July 19 for all recovery personnel who participated in the recovery operations during the Apollo flights. Contact Charles Filley, 333-3919, for more information.

Computers lecture—"Computers in Space", an all-day series of lectures and videotape and film presentations, 10 a.m.-9 p.m., at the Rec Center. The 11:30 a.m. luncheon speaker is John Garman, associate director for Information Systems Planning, Mission Operations. The 6:30 p.m. dinner speaker is Dr. Norm Thagard, astronaut. Tickets are \$5 for lunch, \$7 for dinner and \$11.50 for both. Reservation checks are taken by mail only and should be made payable to: CLC/ACM; 17629 El Camino, Ste. 310, Houston, TX 77058, Attn: Susan Porter. Reservations must be received by July 11.

July 20

Crew escape seminar—A seminar on Apollo crew escape and recovery will be held from 9 a.m. to 2 p.m. July 20 at the Rec Center. Contact Charles Filley, 333-3919, for more information.

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Sale: 50 acres, Hallettsville Rice land, unimproved, very flat, \$800/acre. 996-8410.

Sale: 60 acres, 3 mi. from Karnes City, TX, on Hwy. 80, 50 mi. from San Antonio. 783-9164.

Sale: Heritage Park, 3-2-2 home, freshly painted ext., spa, lg. deck, FPL, Stainmaster carpet, 10.5% assum., near pool, tennis courts and elemen. school, \$69,500. x36619 or 996-0289.

Lease: SW Houston, 2-2-2 townhouse, microwave, W/D, FPL, dishwasher, sec. alarm, ceiling fans, elec. gar. door opener, perfect house/location for two singles. Tom, x31418 or 781-7798.

Sale: Seabrook waterfront property on sm. bay across from Galv. Bay, lg. 100' x 125' homesite, owner fin. 474-5558.

Lease: Pipers Meadow, 3-2-2, fenced, refig., wet bar, FPL, miniblinds, ceiling fans, gar. door opener, \$750/mo. plus dep., no pets. John, x34490 or 481-6372.

Sale: 1 week timeshare, Galv. seawall, 2-2, kitchen, W/D, sleeps 6, deeded. Linda, 482-1156.

Sale: Univ. Green patio home located 5 blks. from the JSC West Gate, very low yard maint., ext. amenities, 2-study or dining-2, 2-car det. gar., clean, \$92,000. Bob, 488-0397.

Sale: 3-3-2 exec. villa, 2,500 sq. ft., borders on golf course and sm. lake, like new, close to Lake Houston, NE of Houston, purchased at \$120,000, sell for \$75,000. 488-0500.

Sale: League City, 2.06 acres near schools, city water and sewer avail., \$39,500. (713) 554-6695.

Sale: Alvin, 3-2, 2-car attached and 2-car det. gar., approx. 3/4 acre, brick, FPL, new loan or assum., no city taxes, \$59,900. x38456 or 388-1090.

Lease: Heritage Park/new sect., 3-2-2, cathedral ceiling, FPL, sep. DR, pass-thru bar, lg. walk-in closets, fenced, gar. opener, \$575/mo. 482-6609.

Sale: Wedgewood Village Subdivision, Friendswood, 2 residential lots, each approx. 70' x 185', neighboring homes 90-100's, one mi. from Clearbrook High School, owner fin. w/ 10% down. 482-5226.

Cars & Trucks

'83 Cadillac Seville, one owner, clean, leather, loaded, 72K mi., \$8,500. 474-3489.

'82 Toyota Corolla, 2 DR, A/C, new radio,

good cond., \$1,200. Steve, x34469 or 532-1405.

'85 Bronco II, 4 WD, V-6, AT, PS, A/C, AM/FM/ster. cass., 20mph, 48K, Eddie Bauer pkg., \$7,000. 333-2218.

'83 Dodge D150 PU, 3-spd. w/OD, radar det., tape, AM/FM, fiberglass, \$2,650. 486-9760.

'79 Oldsmobile Cutlass Supreme, runs but needs work, \$400. Sally, x37485 or 488-5501.

'84 Toyota 4x4 SR5 PU, A/C, cruise, roll bar, trailer hitch, new tires, good cond., \$6,000, OBO. Mark, x36051 or 996-9636.

'84 Mustang LX conv., 6 cyl, blue w/white top, auto., AC, P/S, P/B, AM/FM cass., tilt, cruise, 59K mi., \$6,250. Keith, x30826 or 554-4824.

'82 Chevy Malibu Classic, P/S, AM/FM, AC, ex. cond. Francois, x37175 or 333-3870.

'88 Ford Lariat PU, F150, 5 spd./OD, AM/FM/cass., A/C, low mi., black w/gray int., \$10,600. Kriss, x33578.

'47 Willis jeep, runs great, good body, great for deer hunters, \$900. Mickey, 534-2752.

'83 Ford Escort GT, 1.6L, EFI, 5-spd., manual, one owner, well maint., reliable, P/S, P/B, A/C, 4 speaker AM/FM/cass., 61K mi. Mitch, 335-6168 or 538-3150.

'77 Camaro, 4 bbl., P/S, P/B, AM/FM cass., good tires, alignment needs work. Robert, 333-6191 or 280-8017.

'88 F150 Supercab, 10K mi., 6 cyl., 5-spd./OD, well-equipped, extras, ex. cond. 944-5624.

'81 Ford Courier PU, needs some body work, runs good, rebuilt trans., 5-spd., new clutch, \$750. Ed, x39847 or 559-1215.

Boats & Planes

'85 Glastron CUX16 boat, 84/88, 115hp mariner, Glastron drive on trailer, ski tow bar, \$7,000, OBO. Mark, x36051 or 996-9636.

'18' sailboat w/trailer, comp. set of sails, stove, all safety equip., 4hp Johnson Sailmaster motor, sleeps 2, \$4,200, OBO. 333-5198.

'87 Aquacat catamaran, ex. cond., fast, easy to handle, \$900. 474-7248.

'79 Renegade 1540 ski boat, low profile, 115hp Evinrude OB motor w/SST prop, 50 plus mph, new seats, floor, customized trailer w/new fenders/lights, \$3,800, OBO. Mike, 333-6868 or 486-7846.

'14' sailboat w/trailer, sloop rig w/sails, very wide beam, easy to sail, very lg. cockpit, \$500 cash. Alma, x36556 or Mike, 559-2450.

Cycles

'82 Yamaha 550 Vision w/cover, 10K mi., \$975. Ron, 480-3424.

'86 Honda 700 Interceptor VFR, gear-driven cam V-4, like new, beautiful, red, white, blue, gar. kept, 1,700 mi., \$3,500 nego., B. Reina, x31588 or 488-1326.

Nishiki Century men's 26" 10-spd., incl. extras, ex. cond. 944-5624.

Audiovisual & Computers

Prospero Pro Fortran 77 compiler for Atari-ST, \$50. Peter, 944-0918.

HP-41CV calcu. w/batt. charger, math plus Hm Fin plus ext. functions modules, card-reader, optical wand, manuals, like new, \$300, OBO. Peter, 944-0918.

Household

Two swivel rockers, \$75; coffee table w/2 matching end tables, 2 lamps, \$75. Kandy, x37256 or 482-2750.

Solid dark pine wood bunk beds, shelf bookcase at one end, \$150, OBO; RCA 25" color T.V. on swivel stand, ex. color and sound, \$275, OBO. 471-4843.

Dinette set w/glass table and wicker chairs, \$75. x34975 or 488-7657.

21" Panasonic B/W T.V., ex. cond., \$25 or pick up free. Louise, 282-2509 or 480-5079.

Zenith 23" solid-state console T.V., \$90. 534-3167.

LR furn., imported from China, black lacquer hand painted and hand carved, \$1,900; sectional sofa set, \$400; marble base/glass top dining table w/6 black lacquer chairs, \$1,200. 333-7180 or 561-7182.

Antique double bed head/foot board, 150 yrs. old, BO; breakfast table, leaf, 6 chairs, \$150. Susan, x37441 or 334-1455.

Matching plaid sofa, loveseat, and chair, \$75. 482-2138.

2 sm. (1.6 cu. ft.) refig., perfect for dorm. rm., ex. cond., \$50/ea. 488-4463.

BR furn., 6-pc. black lacquer, contemp. design, imported from Italy, \$1,200. 333-7180 or 561-7182.

Refrig., white, freezer on top, full size, \$75. Brenda, x36037.

Pets & Livestock

Healthy male 3-yr. old African gray parrot (Timothy) w/cage (2x2x3'), and gray perch, good talker, \$250. Keith, 554-5068.

Free to good home, yellow Lab., male, 21 mos. old. 333-6564 or 482-3824.

Wanted

Want anything of value, buy, sell, trade, everything from property to vehicles, appli. to electronics, furn. to sporting goods, will also buy gar. or house full. Cotton, 474-5558 or Pepper, 339-1337.

Want elec. dog training collar(s) w/transmitters. Stan, 280-7638 or 481-8188.

Riders needed, vanpool West Loop Park and Ride to NASA. Richard, x37557.

Full-size camping backpack w/frame and hip belt, good cond. Clare, x34874 or 480-9646.

Musical Instruments

Motorola stereo receiver w/speakers, \$30. 333-9759.

Kawai elec. organ, dual keyboard, rollout

cover, solid oak, ex. cond., \$1,500. 332-9585.

Upright piano, good cond., \$400, OBO; pop-up camper trailer, sleeps 6, needs work, \$600, OBO. 480-6850.

Ibanez Pro-Line elec. guitar w/prog. pick-ups, hard case, 35 watt practice amp, Sholtz Rockman X-100, all for \$700. Richard, 282-4475 or 480-0524.

Lost & Found

Lost: Sapphire ring, triangular-cut stone, Bldg. 44/Heliport parking lot on 3/28. Ellen Porter, 282-3936 or 996-0080.

Found: Calcu. in Bldg. 32, Rm. 142, around the end of April. Matt, x34630.

Lost: Silver Easton softball bat from the 3rd base dugout at field 1 on May 16. Michael, x33206 or 333-3748.

Bracelet found on north side of Bldg. 30, please call and describe. x36884.

Miscellaneous

Majestic Marquis, 33 pt., 14K diamond engagement ring and band, size 8, BO. Louise, 282-2509 or 480-5079.

Chain link dog run, 15' x 6', \$50. Keith, 554-5068.

1 steelcase office desk w/lock and 3 matching ref. tables, all 30" x 60", \$125; Kenmore washer and Frigidaire gas dryer, \$4300/both; Gulbransen piano, good cond., \$400. Susan, x37441 or 334-1455.

Elegant designer wedding gown (Neiman-Marcus), sz. 10, paid, \$1,405, nego. 480-7257.

Barroom size pool table, 1-yr.-old, ex. cond., all access., \$700; rowing machine, \$35. 475-0680.

Elec. kiln, Cress 240 VAC, 17"W x 22"H, w/access., \$300; waterbed, CA king size, 6"W x 7"L, comp. wood frame w/access., \$100. Lee, x33499 or 333-2343.

Remote control truck, \$75; food processor, \$30; prom dress, sz. 14, \$50; Kodak 110 instam. cam., \$10. Stacey, x32649 or 480-9793.

Trailer hitch, 2,000 lb. Class II, fits S-15 Jimmy and S-10 Blazer, fac. unit, attaches to frame (existing holes), chrome, new, \$65. Michael, x33206 or 333-3748.

BRA, IROCZ, custom made, white w/bk. letters, like new, \$50. Sandy, 283-6947 or 486-8198.

Savage model 110E, 7mm mag., Bushnell 3x9 scope, \$200; Technics stereo cabinet, \$20. David, x38102 or 333-3756.

Golf clubs, Tour model System II, 1-9, PW, SW, \$185, metal woods, 1, 3, & 4, \$105 or \$40/ea. David, 554-5514.

Sears riding lawnmower, 5hp, 25 in., 3-spd., 8 cutting levels, runs great, \$275. Linda, x31168 or (409) 925-4862.

Surfboard, 10 ft. Gordon and Smith, ex. cond., \$150. x38456 or 388-1090.

Horse trailer, dual axle, 2-horse trailer, custom built for Tennessee Walkers, new tires,

new flooring and siding, new pads, no rust, \$900. x36889.

One-gal. Hibiscus plants, Altheas, and other varieties, \$2.50. 482-5226.

10 gal. aquarium tank, top, light, undergravel filter, \$35. Mike G., 480-2067 or 488-5921.

Antiques: wheelchair, wooden-back seat, handles, footrest, good cond.; 2 seed sowers; sewing machine, pedal, wooden; iron bed; old trunk; chest of drawers; big iron vice and lightning rods; old record player; books; sm. spinning wheel; old doll; pot plants; old wooden telephone, hangs on wall; Wonder Woman telephone, new modular; new "1847 Wm. Rogers" silver plate set of 56 plus 7 extra pc., serving for 8; quilts and quilt tops. 783-9164.

Gray sofa, loveseat and chair; coffee table and 2 end tables; two gray lamps to match, all for \$275, 5 yrs. old. 640-1487.

Wedding dress, ivory, summer style, tea-length, sz. 8 w/gloves and shoes, all for \$150. 481-4889.

Engagement ring, 18K yellow gold, round diamond solitaire, .68K w/6 round diamonds, .18K, was \$1,500, now \$1,200, OBO. Vincent, x30874 or 333-1316.

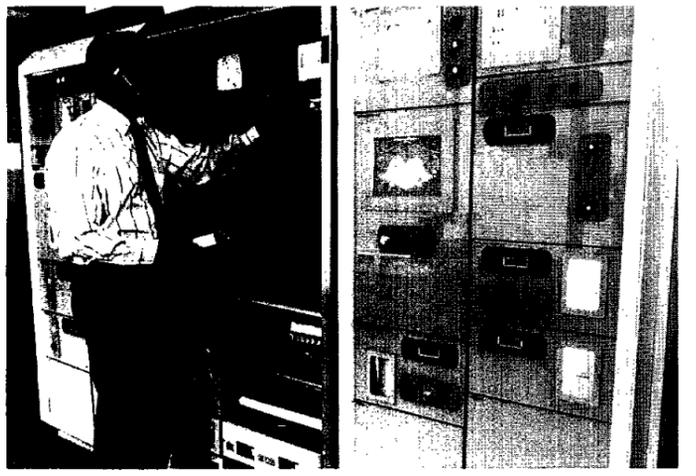
Wedding ring set, .62 pt. Marquis, yellow gold, ring guard w/diamonds, app. avail., \$750. Dallas, x37265 or 486-9520.

Sear's mini-bike, good cond., eng. needs work, \$65. Tony, x35966.

Office credenza, like new, \$100; briefcase, \$10; VHS movies, \$10/ea., Electric Horseman, Plainsman, Adventures of Robin Hood, What's Up Doc?; exer. bicycle, \$50. Linda, x34044 or 280-0909.

25" remote control Zenith console T.V.; skiing exer. machine; Lovejoy SAT preparation software, will trade for QUICKEN software; AM/FM digital car cass.; clean water appli. Tony, 280-

MEDICAL MINIATURIZATION



JSC scientists close in on compact cytometer

By James Hartsfield

In an effort that's drawn attention and help from experts nationwide, JSC scientists are closing in on space station equipment that will analyze some effects of weightlessness by studying the basic building blocks of the human body—single living cells.

Called cytometers, machines that can analyze living cells are nothing new. For example, laser-based flow cytometry technology has been around for at least 12 years, and computer-assisted digital image analysis of cells has been in use twice that long, said Gerald Taylor, M.D., Ph.D., space station science manager for Life Sciences and head of the NASA Inflight Cytometry Project.

Cytometers provide a variety of detailed information about living cells. They are the machines that provide blood cell counts. They also study cells to evaluate viral infections, discriminate between subclasses of cells and determine immune system deficiencies. And they study the runaway division and growth of cells that cause cancer, among other things.

But today's cytometers are not suited for space: a single machine could easily take up 10 square feet of floor space and require the full-time attention of an operator. So JSC's effort concentrates on combining the two major types of cytometers into a single unit and reducing its size, Taylor said.

The implications of developing the new cytometer technology needed for Space Station *Freedom* have a grip on cell analysis experts from across the United States. A personal computer-sized unit such as the one proposed for Space Station *Freedom* could mean spin-offs in the form of terrestrial units

small and simple enough to be used in institutions where, at present, they aren't practical. For example, the time and expense of sending blood samples to a large lab could be reduced if blood cells were analyzed right in the doctor's office.

The possible benefits of a smaller and simpler cytometer are such that the American Cancer Society is working with NASA and has contributed funding to the project to ensure that the final product will be practical for cancer research on the ground, Taylor said.

But the design of the new cytometer is far from NASA's work alone. Scientists, engineers and doctors from institutions around the country have contributed ideas and proposed requirements and technological specifications. So far, assistance has been received from 13 government agencies or contractors, 16 universities and 26 private foundations or individuals—all of it purely voluntary.

This group cooperation was demonstrated recently when 25 experts converged on JSC for a three-day workshop at which the design parameters for a Space Station *Freedom* cytometer were set. In the two years that the Inflight Cytometry Project has been under way, these scientists and engineers have made significant contributions. At JSC, only a few people are involved in the project, and without the constant outside input, progress would have been far slower and the product much less representative of the overall biomedical community's requirements, Taylor said.

"We wanted to get all these people together because we need to have some type of major technological breakthrough to make a cytometer compatible with space flight," he explained.

"Everyone has been very excited about this and they're all eager to help."

The space station cytometer is planned to combine the two major types of cytometers, a flow cytometer and a static cytometer, into one simpler unit.

Flow cytometry is accomplished by rapidly sending cells through an analyzing stream. The cells may pass at a rate as high as 20,000 per minute. The flow method is useful for focusing on a few characteristics of a large group of cells, such as size and type, among other aspects. Flow cytometry contributes to AIDS research and diagnosis. One of the factors that contributes to the diagnosis of AIDS is the relative number of different types of immune cells, called lymphocytes, in the blood. Cancer researchers also use flow cytometry to look at a population of cells and check how many of them are dividing and whether they are dividing properly.

Static cytometry uses some type of microscope, be it an electron microscope, light microscope or fluorescence microscope. Cells can be studied in-depth with this method, allowing doctors to examine a small group of cells for a lengthy period of time. Viral infections in cells, the ability of cells to ward off bacteria and the inner working of cells are studied with static cytometry. Dr. Taylor's group previously has used this method to identify and characterize cancer precursor cells in sputum samples from cigarette smokers.

"We want to do two very complex activities in one less complex module," Taylor said. "It has to be small in relation to today's equipment, and it cannot take up an inordinate amount of the crew's time." The space station unit must

also be within weight limitations and use less power than current terrestrial cytometers.

The experts attending the recent workshop had two goals. Along with setting design requirements for the cytometer, they advised NASA of all the different measurements such a unit could make, Taylor added.

The importance of having a cytometer aboard Space Station *Freedom* is not in the fact that such equipment will work any differently in weightlessness. It lies in the study of weightlessness on humans.

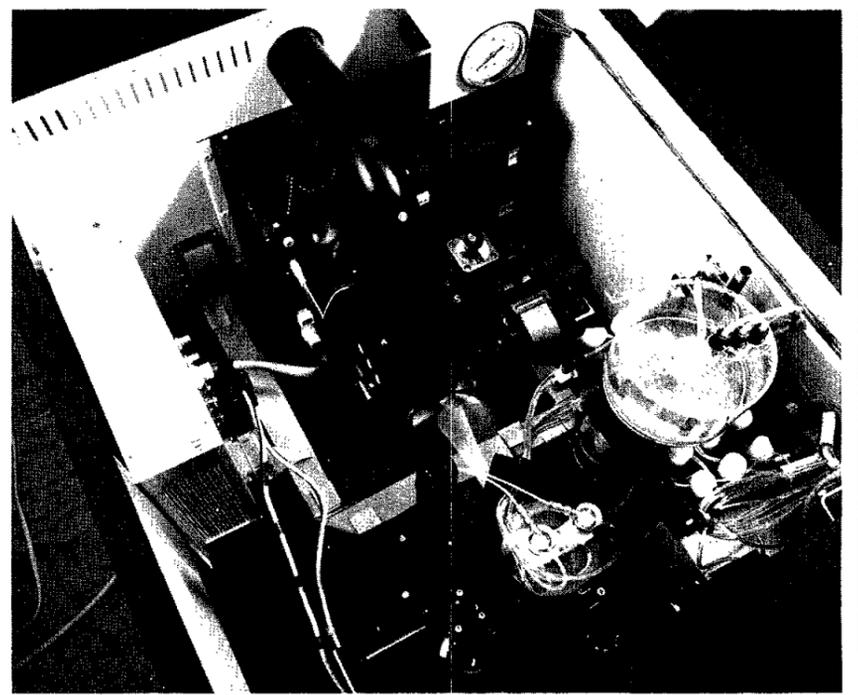
"In flight, the immune capability of astronauts is typically suppressed. Astronauts sometimes also are subjected to unusual radiation environments. Red blood cell mass loss also has been documented," Taylor said. These effects have been determined through post-flight analysis. But to understand the roots of these changes, an in-flight cytometry capability is necessary, he said. It will add up to be an extremely valuable tool in life sciences research.

The smallest cytometers in existence today have been acquired by Taylor's team. One is a flow cytometer from Norway, unavailable commercially in the U.S. Another is a design built in Miami, Florida. The design of both of these machines shows promise, Taylor said. Still, a static cytometer must be incorporated into the unit, its size must still be reduced and its operations must be simplified.

A working model of the final product may be under construction within a year, he said. "With all the help and support we've had, things have really progressed. Everyone is more and more optimistic and excited each time we get together," he added.



Clockwise from top right: 1) Dr. Gerald Taylor, head of the NASA Inflight Cytometry Project, works with a flow cytometer in his Parsec Bldg. laboratory; 2) the inner workings of a flow cytometer that looks at cell nuclei for DNA content; 3) Scott Smith, Krug International's lead scientist for the project, works with the flow cytometer; and 4) Michael Caputo, Krug's imaging systems specialist, works with a prototype in-flight digitizing system that will allow space station crews to downlink photography, video and data from cytometry experiments.



Medical 'spacebridge' network expands, extends

A satellite communications network that has provided a vital link between U.S. and U.S.S.R. medical workers helping victims of last year's earthquake in Soviet Armenia has been expanded and extended.

This month, the network began putting more Soviet doctors—those treating victims of a natural gas explosion—in contact with U.S. medical expertise and reaching additional Soviet citizens.

And regular use of the link, which was scheduled to end yesterday, has been extended at least until July 28. The extension will allow continuing consultations on the explosion victims, as well as six full days of additional discussions about the earthquake victims. The participating Soviet doctors are expected to visit Washington, D.C., in August to dis-

cuss possible further use of the satellite link.

NASA officials announced June 15 that the Spacebridge project was expanding to the Soviet cities of Moscow and Ufa to assist the victims of a huge gas explosion that engulfed two trains on the Trans-Siberian Moscow Railroad in the Ural Mountains outside Ufa on June 4.

Spacebridge began by linking doctors at a Yerevaon, Armenia, medical center with U.S. doctors in Bethesda and Baltimore, Md., Houston, and Salt Lake City medical centers.

More than 20 physicians have been meeting four hours a day, Monday through Friday, since the project began last month to discuss difficult medical cases resulting from the Armenian earthquake disaster. Each

case the doctors review is representative of similar cases. Some cases involve people who lost limbs in the disaster and now need prostheses, reconstructive surgery or rehabilitation. The daily Spacebridge sessions will continue through June 29.

Linked by satellite, the doctors exchange information through audio, visual and facsimile communications at: NASA Headquarters; the Republic Diagnostic Center in Yerevan, Armenia, which is outside the disaster zone; the University of Texas Health Science Center in Houston; the Uniformed Services University of the Health Sciences in Bethesda; the University of Maryland Institute of Emergency Medical Services System in Baltimore; the University of Utah; and LDS Hospital in Salt Lake City.

NASA and participating U.S. physicians have called the Spacebridge a successful endeavor. This program also serves future space exploration by providing Spacebridge participants with information on the operation and management of a complicated telemedicine consultation as might occur on a space station.

The new link with Moscow and Ufa will expand the U.S. medical expertise being used particularly in the treatment of burns. The Soviet Ministry of Telecommunications will provide the technical communications link between Moscow, Ufa and Yerevaon which then will be patched into the existing Spacebridge network.

The new link will use essentially the same protocol that has been used by the Armenian doctors. The Soviet

physicians prepare their cases according to an agenda that sets the subject for each day's consultation, faxing data on the cases to U.S. participants prior to each session.

During the consultation, the Armenian doctors present individual cases—sometimes with the patient present—displaying X-rays, CT scans and other relevant data. The U.S. doctors then make recommendations for treatment or further study.

Many of the Armenian cases discussed to date concern injuries requiring reconstructive or plastic surgery, orthopedics or prosthetics. Post-traumatic stress disorders also account for cases requiring psychiatric or psychological treatment. Many of these consultations have focused on public health issues such as sanitation problems.

Anniversary events grow

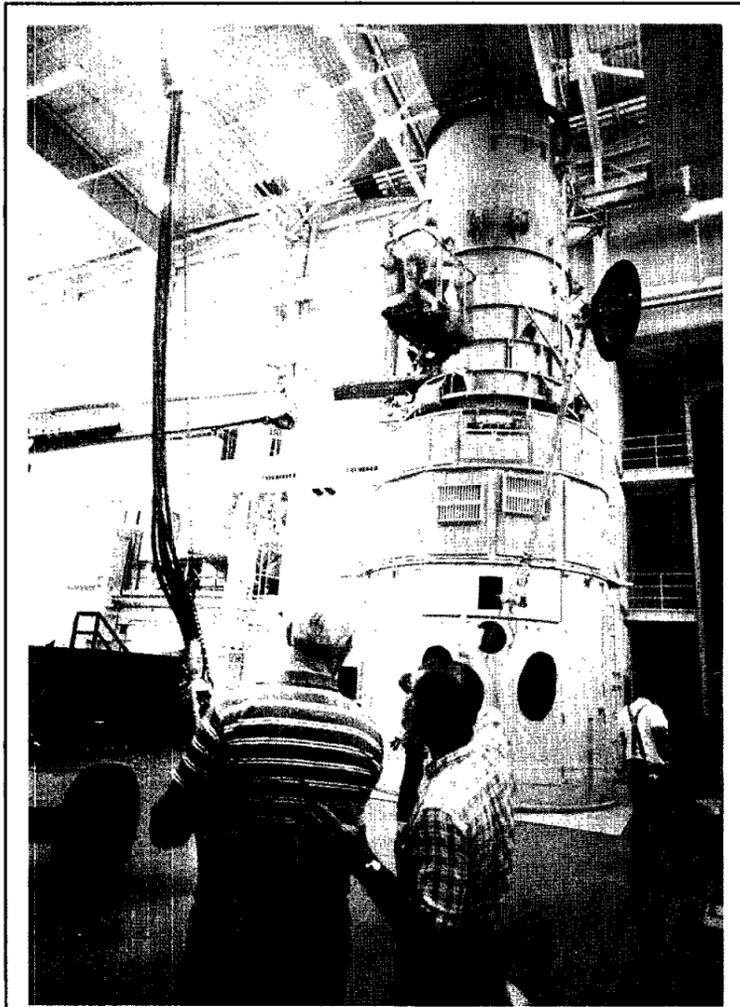
As the week of the 20th Anniversary of the first lunar landing approaches, several activities have been added to the long list of anniversary events already scheduled. These newly confirmed events include:

July 17-23—"For All Mankind", Al Reinhart's 90-minute feature film on manned lunar exploration, will be shown in Teague Auditorium daily, July 17-21, 3-4:30 p.m.; evenings, July 17 and 21, 7:30-9 p.m.; JSC Open House, July 22-23, (see visitors schedule in Bldg. 2 each day).

July 17—A Mission Operations Directorate hospitality suite will be open to MOD employees from 7-11 p.m. at the Kings Inn on NASA Road 1.

July 19—"Computers in Space", an all-day series of lectures and videotape and film presentations, will be held from 10 a.m.-9 p.m. at the Gilruth Recreation Center. Events include an 11:30 a.m. luncheon speaker: John Garman, associate director for Information Systems Planning, Mission Operations; and a 6:30 p.m. dinner speaker: Dr. Norm Thagard, astronaut. Tickets are \$5 for lunch, \$7 for dinner, \$11.50 for both; reservation checks taken by mail only and made payable to: CLC/ACM; 17629 El Camino, Suite 310, Houston TX, 77058, Attn: Susan Porter. Reservations must be received by July 11.

July 20—An Apollo Splashdown Party will be held from 4:30-8:30 p.m., at the Rec Center. The crew of Apollo 11 and famed news commentator Walter Cronkite have accepted invitations to attend. All current and former NASA employees and contractors and their spouses and guests are invited. Tickets are \$3 each and are available from the coordinators listed on JSC announcement 89-112.



TOWERING TELESCOPE—Participants in last week's Satellite Services Workshop check out a full-scale mock-up of the Hubble Space Telescope in Bldg. 9B. The 43-foot-tall steel mock-up is normally used for training in the Weightless Environment Training facility. Sue Boyd, EVA/crew systems engineer, and Jim Thornton and Bob Adams, Rockwell, discussed the extravehicular maintenance capability of the telescope, designed to be serviced every three to five years.

JSC Photo

Blaha to replace Griggs on STS-33

By Jeff Carr

Air Force Col. John E. Blaha has been named to the flight crew of STS-33, a dedicated Department of Defense flight set for Nov. 19. He replaces Navy Rear Adm. S. David Griggs, who was killed June 17 when the private plane he was flying crashed in Arkansas.

Blaha had previously been assigned as the pilot for STS-40, a space and life sciences dedicated mission (SLS-1).

He joins crew Commander Frederick D. Gregory, an Air Force colonel, and Mission Specialists F. Story Musgrave, M.D., Kathryn C. Thornton, Ph.D., and Navy Capt. Manley L. "Sonny" Carter, Jr., M.D., who have been in training since November. The replacement is not expected to affect the launch date.

Replacing Blaha as pilot for STS-40 is Air Force Maj. Sidney M. Gutierrez. Set for launch in August

1990, the seven-day flight will feature space and life sciences studies in the SLS-1 laboratory module aboard the space shuttle *Columbia*.

Gutierrez joins crew Commander Bryan D. O'Connor, a Marine Corps colonel, Mission Specialists M. Rhea Seddon, M.D., James P. Bagian, M.D., and Tamara E. Jernigan, Ph.D., and Payload Specialists F. Drew Gaffney, Ph.D., and Robert W. Phillips, Ph.D., who had already been assigned to the flight.

In another crew assignment, Mary L. Cleave, Ph.D., and Norman E. Thagard, M.D., have been named as mission specialists for STS-42, a nine-day flight aboard *Columbia*, set for December 1990. The partial crew assignment will allow for long-range payload training and integration associated with the International Microgravity Laboratory (IML-1). The remainder of the seven-member crew will be named later.

Tanner to leave NASA

E. Ray Tanner, NASA deputy director of the Space Station Freedom Program and Operations, announced Tuesday he plans to retire from NASA effective July 15, 1989.

Dr. William B. Lenoir, associate administrator for space station, named Jim Sisson as acting deputy director. Sisson currently serves as deputy program manager for the Space Station Freedom Program Office in Reston, Va., a position he has held since November 1986.

Prior to coming to NASA Head-

quarters, Sisson held key management posts at the Marshall Space Flight Center, including manager of the Tethered Satellite System Project and the Shuttle Engineering and Major Test Management Office and chief engineer and later manager of the Lunar Roving Vehicle Project.

Tanner, who joined NASA in 1960, moved to the Washington area last December to head the Space Station Freedom Program Office in Reston. Prior to that, he was manager of the Space Station Projects Office at Marshall.

Apollo expeditions seen as precursors to colonization

(Continued from Page 1) played in the discoveries of new worlds here on Earth. Expeditions on the uncharted seas were feared and those that dared suggest them were viewed with a wary eye.

"Columbus had to be funded by the state and he had triple redundancy with the Nina, the Pinta and the Santa Maria," says Dr. Wendell Mendell, JSC lunar scientist. "But within a few years there was regular sea transportation and transportation the pilgrims could

afford. Cost and risk had dropped significantly.

"I believe that same phenomena will occur in space transportation," Mendell says. "It's hard to see that now because all we can see is the risk and failure. But we are moving into a new era in space travel where we will travel routinely to destinations a few days away and that includes the Moon."

Apollo provided the expeditions. Future missions should lay the groundwork for permanent settlement, he says.

"The space program is moving into a mind set where expeditions are no longer useful," he says. "We are trying to establish a permanent presence in space, our first permanent foothold...and an official foothold on the Moon will be our first step into the solar system."

And the time to begin paving a permanent path to the Moon is now, says Mendell.

"My feeling is that we are at the very threshold of space exploration tech-

nology in terms of reliability and the operational capability that will enable us to go to various places," Mendell says.

Lunar samples that initiated such excitement in the scientific community 20 years ago continue to provide clues to tomorrow's uses of the Moon.

"I think scientific interest in the lunar samples peaked early in the Apollo project but there's been a strong continuing interest in lunar sample research," says Dr. David Black,

director of the Lunar and Planetary Institute and another presenter. "Now, however, a new thrust is in the area of lunar resources and the role that development might play in possible exploration expeditions."

Other program presenters are Dr. John A. Wood, a geologist at the Harvard-Smithsonian Center for Astrophysics, and Dr. Larry Haskin, chairman of the Department of Earth and Planetary Sciences, Washington University in St. Louis.

Greene joins shuttle program office

(Continued from Page 1) responsible for developing, implementing and maintaining the overall safety activity for JSC. He also served as chairman of the NSTS systems safety review panel.

Williams has been at JSC since 1962 transitioning from Apollo to Shuttle. He served as the deputy manager of the Engineering Integration Office during the Shuttle recovery activity and most recently served as deputy manager then acting manager of the Integration and Operations Office.

Lambert's extensive background

with NASA began in 1957 at the Langley Research Center as a research engineer on meteorite impacts on various materials. From 1958 to 1961 he was a project engineer responsible for the 15-inch solid rocket spherical motor and contract monitor for the 25- and 40-inch spherical rocket development program.

From there, Lambert moved to JSC as a propulsion engineer responsible for technical management for the STS subscale ablative chamber test program. In 1963 he became chief of the Development and Test Section

providing technical design support for propulsion systems.

From 1965-1967 he managed development of the Lunar Module descent propulsion system in the Apollo Program. Lambert later was responsible for all Apollo propulsion subsystems.

In 1970 Lambert moved over to the Shuttle program providing evaluation and definition of Level II requirements for Shuttle payload accommodations. He held other payload integration positions with increasing responsibility until becoming manager of the Customer Integration Office in 1986.

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Child care center groundbreaking moved to July 7

A groundbreaking ceremony for the planned JSC Child Care Center has been rescheduled for 2 p.m. July 7 near the intersection of Second Street and Avenue B.

The ceremony had been scheduled for June 23, but was postponed because of rain and wet ground.

All employees are invited to attend the rescheduled event near the Gilruth Recreation Center.